

CLAIMS:

1. A method of comparing one or more reference samples of DNA method according to claim 1 in which the reference samples are from known individuals and/or associated with other known factors with at least part of a test sample of DNA from a known individual and/or be associated with one or more other known factors, the method including:-

the determination of the identity of the alleles present at a locus for the DNA in the test sample, the determination defining an individual test result, the determination being performed for a plurality of loci to give a plurality of individual test results, the consideration of one of the plurality of individual test results against the individual reference result of one of the reference samples for the respective loci, the consideration involving an expression of the probability that the individual reference result for that locus could lead by various possible routes to the individual test result for that locus, the possible routes to the individual test result including routes where spurious information contributes to the individual test result, the expression of the probability is a probability function and the probability function includes a probability that contamination may occur, a probability that stutter may occur, a probability that allele dropout may occur, and a probability that artifact reporting may occur; the consideration being repeated for a plurality of loci, the expressions of probability that the individual reference result could lead to the individual test result for the plurality of loci being combined to give an expression of the probability that the test sample matches the reference sample by calculating a likelihood ratio.

2. A method of comparing one or more reference samples of DNA with at least part of a test sample of DNA, the method including:-

the determination of the identity of the alleles present at a locus for the DNA in the test sample, the determination defining an individual test result, the determination being performed for a plurality of loci to give a plurality of individual test results, the consideration of one of the plurality of individual test results against the individual reference result of one of the reference samples for the respective loci, the consideration

involving an expression of the probability that the individual reference result for that locus could lead by various possible routes to the individual test result for that locus, the possible routes to the individual test result including routes where spurious information contributes to the individual test result;

the consideration being repeated for a plurality of loci, the expressions of probability that the individual reference result could lead to the individual test result for the plurality of loci being combined to give an expression of the probability that the test sample matches the reference sample by calculating a likelihood ratio.

3. A method according to claim 1 in which the reference samples are from known individuals and/or associated with other known factors, such as locations, items or events.
4. A method according to claim 1 in which the test sample is from a known individual and/or be associated with one or more other known factors, such as a location, item or event the sample was recovered from.
5. A method according to claim 1 in which the consideration involves the determination of a likelihood ratio, the likelihood ratio accounting for the probability of the individual sample result arising from the individual reference result against the probability of the individual sample result arising from other than the individual reference result.
6. A method according to claim 1 in which the consideration involves the probability of the individual test result arising given that individual reference result, including through spurious information occurrence, for each individual test result, divided by the product of the probability of the individual test result arising from other than the individual reference result, including through spurious information occurrence, and the frequency of that individual reference result in a population, for each individual test result.
7. A method according to claim 1 in which in order to evaluated a mixture for a known and unknown contributor scenario, the likelihood ratio is the probability of the individual test result arising from an individual stored result, and other than the individual

stored result divided by the probability of the individual test result arising from other than the individual stored result and from other than the individual stored result.

8. A method according to claim 1 in which the probability of observation of alleles is calculated from the frequency of occurrence in relevant populations and used in the consideration.

9. A method according to claim 1 in which, where contamination is necessary to lead to the individual test result the probability includes a probability term for spurious allele occurrence.

10. A method according to claim 1 in which, where contamination must not occur to lead to the individual test result the probability includes a probability term for spurious allele non-occurrence.

11. A method according to claim 1 in which, where stutter is necessary to lead to the individual test result the probability includes a probability term for stutter occurrence.

12. A method according to claim 1 in which, where stutter must not occur to lead to the individual test result the probability includes a probability term for stutter non-occurrence.

13. A method according to claim 1 in which, where allele dropout is necessary to lead to the individual test result the probability includes a probability term for allele dropout occurrence.

14. A method according to claim 1 in which, where allele dropout must not occur to lead to the individual test result the probability includes a probability term for allele dropout non-occurrence.

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15. A method according to claim 1 in which, where artifact reporting is necessary to lead to the individual test result the probability includes a probability term for artifact reporting occurrence.
16. A method according to claim 1 in which, where artifact reporting must not occur to lead to the individual test result the probability includes a probability term for artifact reporting non-occurrence.
17. A method according to claim 1 in which the probability function includes a probability that contamination may occur, the probability that contamination may occur being determined by one or more control determinations.
18. A method according to claim 1 in which the probability function includes a probability that stutter may occur, the probability that stutter may occur being determined by one or more control determinations.
19. A method according to claim 1 in which the probability function includes a probability that allele dropout may occur, the probability that allele dropout may occur being determined by one or more control determinations.
20. A method according to claim 1 in which, the probability function includes a probability that artifact reporting may occur, the probability that artifact reporting may occur being determined by one or more control determinations.
21. A method according to claim 1 in which the consideration is applied to all loci for which individual stored results and individual test results exist.
22. A method according to claim 1 in which the combination of probabilities produced by the respective considerations is obtained by multiplying the probabilities together.

23. A method according to claim 1 in which two or more different determinations of the identities of the alleles in the test sample are performed, the method of claim 2 being applied to each set of individual test results thereby obtained, the expression of a likelihood ratio for respective sets of individual test results being considered against one another and/or combined.

24. A method of indicating a likelihood ratio that evaluates that at least a part of a DNA test sample arose from a known source, the method involving:-
one or more determinations of the identity of the alleles present at a locus for the DNA in the test sample, each determination defining an individual test result;
the determination of at least some of the theoretical allele identities which could have produced a given individual test result, these identities forming the individual reference results;
the determination of the identity of the alleles present at the locus for the DNA from the known source;
one of the theoretical allele identities being the identity determined for that locus for the known source;
the provision of a probability function for each individual reference result considered which is representative of at least some of the various possible routes by which that given individual reference result may lead to the given individual test result, that probability function further being representative of the likelihood of that individual reference result's occurrence and the possible routes to the individual test result which includes routes where spurious information contributes, this probability function defining the theoretical probability functions;
the theoretical probability functions for different individual reference results being combined to give an indication of the various ways in which the given individual test result could be reached, this combination forming the combined theoretical probability function;
the provision of a probability function for the individual reference result matching the known source's identity, which is representative of the manner in which that individual reference result leads to the individual test result, this forming the known source's theoretical function;

the known source's theoretical function and combined theoretical function being considered together to calculate the likelihood ratio.

25. A method according to claim 24 in which at least part of a DNA sample refers to one source of a multi-source or mixed sample.

26. A method according to claim 24 in which the known source refers to a known individual and/or be associated with one or more other known factors, such as a location, item or event the sample was recovered from.

27. A method according to claim 24 in which the theoretical identities are determined from the alleles indicated in the individual test result, those theoretical identities which could reasonably lead to the individual test result being determined.

28. A method according to claim 24 in which the provision of a probability function involves the probability of getting that individual test result in any way, including through spurious information occurrence, and the frequency of that theoretical identity in a population, for each individual test result.

29. A method according to claim 24 in which the theoretical probability function for each individual reference result theoretical identity is defined in part by a probability for that individual reference results identity occurrence in a population.

30. A method according to claim 24 in which the theoretical probability function for each individual reference result is defined in part by a probability for the various occurrences which would result in that individual reference result giving the individual test result.

31. A method according to claims 24 in which theoretical probability functions are provided to account for each of the individual test results determined for a locus in the aforementioned manner.

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32. A method according to claim 30 in which the theoretical probability functions for each individual test result given an individual reference result are combined.

33. A method according to claim 24 where contamination is necessary to lead to the individual test result the probability includes a probability term for spurious allele occurrence and/or where contamination must not occur to lead to the individual test result the probability includes a probability term for spurious allele non-occurrence and/or where stutter is necessary to lead to the individual test result the probability includes a probability term for stutter occurrence and/or where stutter must not occur to lead to the individual test result the probability includes a probability term for stutter non-occurrence and/or where allele dropout is necessary to lead to the individual test result the probability includes a probability term for allele dropout occurrence and/or where allele dropout must not occur to lead to the individual test result the probability includes a probability term for allele dropout non-occurrence and/or where artifact reporting is necessary to lead to the individual test result the probability includes a probability term for artifact reporting occurrence and/or where artifact reporting must not occur to lead to the individual test result the probability includes a probability term for artifact reporting non-occurrence.

34. A method according to claim 24 in which the various possible routes for the individual reference result giving the individual test result include contamination giving one or more alleles in the individual test result not present in the individual reference result.

35. A method according to claim 24 in which the various possible routes for the individual reference result giving the individual test result include stutter giving one or more alleles in the individual test result not present in the individual reference result.

36. A method according to claim 24 in which the various possible routes for the individual reference result giving the individual test result include amplification of artifacts

giving one or more alleles in the individual test result not present in the individual reference result.

37. A method according to claim 24 in which the various possible routes for the individual reference result giving the individual test result include allele drop out giving one or more alleles missing in the individual test result present in the individual reference result.

38. A method according to claim 24 in which the theoretical probability functions are combined to give the overall combined theoretical probability function by summing the theoretical probability functions together.

39. A method according to claim 24 in which the provision of the probability function for the individual reference involves the probability of getting that individual test result given that individual reference result, including through spurious information occurrence, for each individual test result.

40. A method according to claim 24 in which the likelihood ratio accounts for the probability that a given individual reference result / theoretical identity leads to the individual test result against the probability that the individual test result was lead to in another way.

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